ENGLISH TRANSLATION OF OFFICIAL MEXICAN STANDARD

NOM-017

1. PURPOSE AND SCOPE.

The purpose of this Official Mexican is to set forth the general guidelines for loading, distribution and securing of hazardous materials into units of highway transport and rail carriage.

2. REFERENCES

For the proper implementation of this standard, it is necessary to consult the following Official Mexican Standards:

NOM-002-SCT2-1993	List of the Most Commonly Carried Substances.
NOM-011-SCT2-1993	Compatibility for the Storage and Transport of Hazardous Materials and Wastes.

3. DEFINITIONS.

DEFINITIONS OF LOAD SECUREMENT SYSTEMS, ASSEMBLIES, COMPONENTS AND WORKING LOAD CAPACITIES.

3.1 LOAD SECUREMENT SYSTEMS. - Load securement systems means: chains, steel cables and synthetic fibre cables or synthetic belts for securing the load onto the vehicle.

3.1.1 Materials for load securement system.

3.1.1.1 THESE INCLUDE: All the oval link chains made of a rounded material in four grades of different sizes.

a) grade 3
b) grade 4
c) grade 7
d) grade 8

3.1.1.2 All cables made of synthetic fibre.
Synthetic cables shall be made of 3 braided strands.

3.1.1.3 ALL SYNTHETIC BELTS.- Synthetic belts for load securement; the most commonly used sizes for securing cargo are the following:

45 mm	51 mm	76 mm	102 mm
(1-3/4")	(2")	(3")	(4")

3.1.1.4 ALL STEEL CABLES.- Steel cables of various diameters shall consist of various steel wires twisted together. The material is also known as cable.

3.2 ACCESSORIES AND APPURTENANCES: These are items used together with the load securement systems or integrated into them for securing or tightening purposes. They include:

3.2.1 FOR THE CHAINS:

a) fastening hooks
b) cargo tie-downs
c) shackles

3.2.2 FOR THE FIBER CABLES:

a) thimbles
b) eyelets woven with thimbles
c) winches
d) connections

3.2.3 FOR THE SYNTHETIC BELTS:

a) hooks
b) pawls
c) triangles or d-rings
d) winches
e) woven eyelets

3.2.4 FOR THE STEEL CABLES:

a) hooks
b) shackles
c) ferrules
d) endpieces
e) stretchers
f) winches

3.3 TIE-DOWN POINTS.- The point where the load securement system is attached to the vehicle. If the tie-down point is not adequate to support the capacity of the load securement system, then the design capacity will be limited to the strength of the tie-down point.

3.4 MINIMUM BREAKING LOAD.- This is the minimum stress under which the product breaks or the cargo is no longer secured.

3.5 WORKING CAPACITY OR DESIGN CAPACITY.- This is the maximum load that may be applied to the product in the following manner:

3.5.1 For chains, the working capacity shall be, as a maximum, 1/3rd of the minimum breaking strength of the assembly.

3.5.2 For synthetic fiber cables, the working capacity shall be, as a maximum, 1/10th of the minimum breaking strength of the fiber, plus a 50% reduction to account for the knots and folds.

3.5.3 For synthetic belts, the working capacity shall be, as a maximum, 1/3rd of the minimum breaking strength of the assembly.

3.5.4 For steel cables, the working capacity shall be, as a maximum, 1/3rd of the minimum breaking strength, plus a 25% reduction to account for the efficiency of the endpieces.

3.6 Method for calculating the working capacity.

3.6.1 The working capacity, or quantity of load securement systems to be used for a payload, shall be, as a minimum, 1/2 (0.5) times the weight of the item divided by the working capacity of the load securement system.

The working capacity of the agreements may be taken from the tables or labels attached to the load securement system.

If there are no labels or markings in the load securement system, the lowest capacity indicated in the tables shall be used for the calculation.
The above paragraph may be expressed algebraically as follows:

$$N'SCF = \frac{LOAD \times 0.5}{MAXIMUM\ WORKING\ LOAD}$$ IN WHICH

N'SCF = AMOUNT OF LOAD SECUREMENT SYSTEMS TO BE USED.

LOAD = WEIGHT OF LOAD TO BE SECURED OR PAYLOAD.

MAXIMUM WORKING LOAD = THIS IS THE MAXIMUM WORKING LOAD OF THE LOAD SECUREMENT SYSTEM.

4. MAXIMUM WORKING LOAD.

Tables 4.1, 4.2, 4.3 and 4.4 below list the maximum working loads to be used when a material can be identified in particular as well as when there is no identification whatsoever. If the chain rating cannot be identified, the maximum working load of Grade 3 chain shall be used. Both steel cables and synthetic fiber cables include a variety of types, some of which may have higher load limits than indicated in the tables. If there are labels identifying another capacity, such as, for example, a label in the winch of a crane that indicates a higher maximum working load, such a value is acceptable.

TABLE 4.1 CHAINS. CHAINS MUST MEET THE FOLLOWING MINIMUM SPECIFICATIONS.

4.1.1 MAXIMUM WORKING LOAD.

SIZE mm (IN.)	GRADE 3 KGS (LBS.)	GRADE 4 KGS (LBS.)	GRADE 7 KGS (LBS.)	GRADE 8 KGS (LBS.)
7 (1/4")	580 (1300)	1180 (2600)	1430 (3150)	1590 (3500)
8 (5/16")	860 (1900)	1770 (3900)	2130 (4700)	2310 (5100)
10 (3/8")	1200 (2650)	2450 (5400)	2990 (6600)	3200 (7100)
12 (7/16")	1590 (3500)	2650 (5800)	3970 (8750)	
13 (1/2")	2040 (4500)	4170 (9200)	5230 (11300)	5400 (12000)
16 (5/8")	3130 (6900)	5220 (11500)	7170 (15800)	8200 (18100)

4.1.2 IDENTIFICATION OF THE GRADE OF A CHAIN.

GRADE 3 TORSION TEST	GRADE 4 MAXIMUM TEST	GRADE 7 TRANSPORT	GRADE 8 ALLOY
PT	PM		A.T.
3	4	7	8

30 43 70 80
430 700 800

TABLE 4.2 SYNTHETIC FIBER CABLES.

4.2.1 Maximum working load in kg and lbs., including the reduction to account for knots and folds.

DIAMETER		LOAD	
mm	in.	kgs	lbs.
10	3/8"	60	125
11	7/16" 80	175	
13	1/2"	90	200
16	5/8"	140	300
20	3/4"	180	400
25	1"	300	650

TABLE 4.3 SYNTHETIC BELTS.

4.3.1 The maximum working load for synthetic belts and their assemblies shall be, as minimum:

INCHES	KGS.	LBS.
1-3/4" 750	600	
2"	1500	3300
3"	1960	4300
4"	2300	5000

TABLE 4.4 STEEL CABLES.

4.4.1 Maximum working load (M.W.L.)

DIAMETER		M.W.L.	
MM	IN	KGS.	LBS.
7	1/4"	640	1400
8	5/16" 950	2100	

10	3/8"		1360	3000
11	7/16"	1860	4100	
13	1/2"	2400	5300	
16	5/8"	3770	8300	
20	3/4"	4940	10900	
22	7/8"	7300	16100	
25	1"		9480	20900

4.5 IDENTIFICATION OF THE ACCESSORIES.

All accessories for chains and steel cables as well as all synthetic accessories must be identified, except for the ferrules and wire accessories.

4.5.1 All the accessories that may be separated from a load securement system must be identified with the following indications:

a) Maximum working load in pounds, kilos, tons or grade and size of chain, steel cable or synthetic belt.

4.5.2 The manufacturer's identification must be affixed onto any chain, steel cable or synthetic belt, with the exception of ferrules, thimbles and accessories made of wire or wire rope.

4.5.3 Each hazardous material package to be transported must be loaded securely in accordance with the Standard, as indicated below:

Secure load, limited shifting is authorized if approved by the Department of Transportation.- The hazardous material packages must be secured to prevent the packages from changing their position, falling onto the floor, or gliding against one another owing to the movements inherent to normal transport conditions. This requirement shall not prevent the use of load methods designed to allow limited shifting of the cargo.

4.5.3.2 All hazardous material packages that display a "this side up" marking must be secured in such a way that they remain in the position indicated by said markings during their transport.

4.5.3.3 The cargo may be handled mechanically, but it must not be allowed to fall.- A heavy package, or one containing hazardous materials, may be moved by truck, glided or moved through an unloading ramp, a lift truck or other handling devices. The cargo

may not fall from any truck, platform or railcar. The ramps for sliding the trucks from the platforms or railcars must have bevelled edges.

4.5.3.4 The cargo must be stored in a secure place on the docks.- The carrier must store the hazardous materials in a secure place while waiting to be loaded or delivered. The carrier must make sure that persons unrelated to the shipping company do not have access to these hazardous materials.

SPECIAL REQUIREMENTS

4.5.3.5 The hazardous material packages must be secured against shifting.

a) PACKAGES SECURED IN A VEHICLE.

Any tank, drum, cylinder or any other packaging that contains: flammable liquids, compressed gases, corrosive materials, corrosive materials, poisonous materials or radioactive materials must be secured against shifting within the vehicle in which they are being transported.

PREVENTING THE RELATIVE SHIFTING AMONG CONTAINERS.

4.5.3.6 Securement to avoid any vehicle-related shifting.- Containers of explosives, flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases and poisonous liquids or gases, must be secured to avoid shifting within the vehicle.

4.5.3.7 **COMBINATIONS OF CARGO**

In any automotive vehicle with a trailer or semi-trailer, hazardous materials must not be loaded together if they are incompatible.

4.5.3.8 **MIXED CARGOS.**

Flammable solids, oxidizing materials, or corrosive liquids. Whenever these are transported in an automotive vehicle with another compatible cargo, they must be loaded in such a way as to make the unloading operation safer.

5. INSPECTION STANDARDS

5.1 Chains

5.1.1 Whenever chains are found to have any of the following damages, their use shall be discontinued:

a) broken or cracked links
b) any dent, wear and tear, abrasion
c) any twisting, folding or misshaping
d) knots

5.2 Synthetic fiber cables

5.2.1 Whenever synthetic fibre cables are found to have any of the following damages, their use shall be discontinued:

a) burnt fiber.

b) evidence of excessive wear and tear in the inner or outer fibers.

c) evidence of loss of strength with a marked reduction in cable diameter.

d) Knots in the fiber.

5.3 Synthetic belts.

Whenever synthetic belts are found to have the any of the following damages, their use shall be discontinued:

5.3.1 a) The belt exhibits cuts, burns and/or punctures.

b) The belt exhibits seam separation over 1/4th of total sewn area.

c) If the belt has any broken or malfunctioning accessory or device, or any folded, twisted, cracked or dented accessory, device, stretcher or tie-down.

d) If the belt has any knots, splices or repair.

e) The belt has any defect such as crushing, damaged accessories, or severe wear and tear.

5.3.2 DEFECT CLASSIFICATION TABLE

WIDTH OF BELT		DISCONTINUE USE
MM	IN.	
102	4	OVER 19 mm (3/4")
75	3	OVER 16 mm (5/8")
50	2	OVER 10 mm (3/8")
45	1.75	OVER 10 mm (3/8")

5.4 Steel cables.

5.4.1 When steel cables are found to have any of the following damages, their use must be discontinued:

a) If we [sic] have folds, steel cores, cable centers that protrude in the working section of the cable.

b) Discoloring of the steel cable owing to excessive temperature produced by electric arc or flame in the working section of the cable.

c) Corrosion in the inner or outer pitted wires.

d) More than eleven broken wires over a length of 6 mm in diameter. For example: in a 13 mm (1/2") cable, more than eleven wires in 6 x 13 mm = 78 mm (6 x 1/2 = 3").

e) More than two broken wires in their tie-down point, or the coupling of accessories.

5.5 Accessories

5.5.1 Whenever accessories are found to have any of the following damages, their use shall be discontinued:

a) When there is an obvious reduction in any accessory section, whether from wear and tear or from corrosion.

b) When the accessory is misshaped or stretched out.

c) When the accessory hooks are opened up and have lost their original parallelism or opening.

d) When the accessory has been twisted or distorted from its original axis.

e) Accessories that have become welded or discolored due to excessively high temperature.

f) Visible cracks in the accessories.

g) When sliding of the cable in the accessory can be detected.

5.6 Tie-down points.

5.6.1 When tie-down points are found to have any of the following damages, their use shall be discontinued:

a) Whenever there are breaks, cracks, excessive wear and tear or improperly welded supports.

b) Rails that are folded or distorted at the points of coupling of hooks or accessories.

c) Anchoring rings that exhibit wear and tear, cracks, folds, stretching or welds that have fallen apart.

6. REPAIRS

6.1 Chains

6.1.1 Links: links of the jaw type that have a breaking strength equal to or greater than the chain are acceptable.

6. 1.2 Tie-down accessories: these may only be replaced by those of the jaw type.

6.2 Fiber cables: fiber cables must not be repaired for use in the load securement system.

NOTE: The various correctly spliced sections are not considered as repairs.

6.3 Synthetic belts

6.3.1 Synthetic belts must not be spliced or repaired for use in load securement systems.

6.4 Steel cables

6.4.1 Steel cables must not be spliced or repaired.

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